Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin relaxation of conduction electrons by inelastic scattering with neutral donors[1] LAN QING, HANAN DERY, University of Rochester, Rochester, New York 14627, JING LI, IAN APPELBAUM, University of Maryland, College Park, Maryland 20742 — At low temperatures in n-doped semiconductors, a significant fraction of shallow donor sites are occupied by electrons, neutralizing the impurity core charge in equilibrium. Inelastic scattering by externally-injected conduction electrons accelerated by electric fields can excite transitions within the manifold of these localized states. Promotion into highly spin-mixed excited states results in spin relaxation that couples strongly to the conduction electrons by exchange interaction. Through experiments with silicon spin transport devices and complementary theory, we reveal the consequences of this previously unknown depolarization mechanism both below and above the impact ionization threshold and into the "deep inelastic" regime.

[1]This work is supported by NSF under contracts ECCS-1231570 and ECCS-1231855, by DTRA under contract HDTRA1-13-1-0013, and by ONR under contract N000141410317.

Lan Qing
Department of Physics and Astronomy,
University of Rochester, Rochester, New York 14627

Date submitted: 11 Nov 2014 Electronic form version 1.4